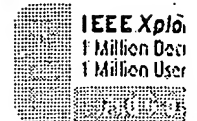


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## Formation and properties of ternary silicide ( $\text{Co}_x\text{Ni}_{1-x}$ )Si thin films

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### Abstract:

A ternary silicide ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> formed by Ni and Co thin films or Ni, Co and Ti thin films deposited on a Si(100) substrate is studied. The results show that a highly conductive silicide ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> can be formed by solid phase reaction of either Ni/Co/Si or Co/Ni/Si structures. The resistivity of the silicide films is in the range of (15-20)  $\mu\Omega\cdot\text{cm}$ . The formation temperature of ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> is rather low compared the disilicides of Co and Ni. XRD data show that ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> has a CaF<sub>2</sub> structure its lattice constant is between that of CoSi<sub>2</sub> and NiSi<sub>2</sub>. ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> can also be formed by rapid thermal annealing of a Co/Ni/Ti/Si multilayer structure. A quite low  $\chi_{\text{min}}$  value shown by RBS/channeling investigation. The joint has a better epitaxy quality as compared with that without a Ti interlayer. It is more uniform and has a good thermal stability and low resistivity. Experiments with two step annealing and chemical selective etching demonstrate that a self-aligned silicided contact and a gate-level interconnection structure can be formed on Si wafers

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